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(54) **METHOD FOR MANUFACTURING SILVER NANOWIRES**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2007/0034052 A1 2/2007 Vanheusden et al.

2009/0196788 A1* 8/2009 Wang **B22F 9/24**

420/501

(Continued)

FOREIGN PATENT DOCUMENTS

CN 1709791 A 12/2005

JP 2009155674 A 7/2009

(Continued)

OTHER PUBLICATIONS

Machine translation of KR10-2010-0055983. May 2010.*

(Continued)

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(57) **ABSTRACT**

Provided is a method for producing Ag nanowires, including, heating a precursor solution that includes: an Ag salt; a water-soluble polymer; a surfactant, or a halide of metal ions having a standard reduction potential of -0.1 to $-0.9V$ as a metal catalyst; and a reduction solvent, to produce the Ag nanowires. According to this method, a time for synthesizing nanowires may be considerably decreased, and an amount of Ag precursor discarded without reaction may be effectively reduced. As a result, the Ag nanowires may be produced with high efficiency and mass-production thereof through a simple scale-up may be successfully achieved.

12 Claims, 8 Drawing Sheets

